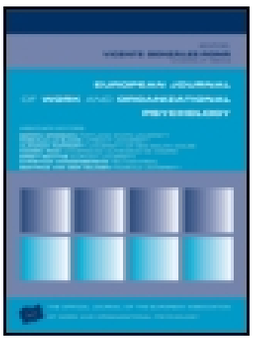

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Building and sustaining work engagement – a participatory action intervention to increase work engagement in nursing staff

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ABSTRACT

This study evaluated whether a participatory action research intervention with nursing staff on acute care older people National Health Service wards in the United Kingdom was effective for increasing work engagement. Mediation analyses between job resources (social support, influence in decision-making), job demands, work-related needs (autonomy, competence, relatedness), and work engagement explored the presumed psychological mechanisms underlying the intervention. A non-randomized, matched control group, pretest, post-test design involved three intervention and five control wards. A significant decrease in relatedness, and a borderline significant decrease in competence, was observed in the intervention group compared to the control group, with no effect on work engagement ($N = 45$). Work-related needs mediated between resources and work engagement, supporting the job demands-resources model and self-determination theory as an underlying explanatory theory. Intervention implementation was difficult, highlighting the need for participant and organizational readiness for change, and strong management support. This is the first known study to apply participatory techniques to increase work engagement in nursing staff and explore the underlying explanatory psychological mechanisms, offering a novel means of taking work engagement research forward. Crucially, it highlights the challenges involved in intervention research and the importance of including evaluations of intervention implementation alongside statistical evaluations to avoid erroneous conclusions.

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Participatory intervention; work engagement; nursing staff; job demands-resources model; self-determination theory

Introduction

Work engagement interventions have so far focused on the individual employee, whether through group (e.g., Van Berkel, Boot, Proper, Bongers, & van der Beek, 2014; Vuori, Toppinen-Tanner, & Mutanen, 2012), online (e.g., Imamura et al., 2015; Ouweneel, Le Blanc, & Schaufeli, 2013), or one-to-one, face-to-face programmes (e.g., Hengel, Joling, Proper, Blatter, & Bongers, 2012; for a systematic review and meta-analysis, see Knight, Patterson, & Dawson, 2016). In contrast, this paper evaluates the effectiveness of a longitudinal, team-based intervention for increasing work engagement that was developed as part of a larger study to increase hospital quality of care for older people on acute National Health Service (NHS) wards in the United Kingdom. In so doing, we also focus on the underlying psychological mechanisms theorized to explain the presumed effects of the intervention. Specifically, and in accordance with the job demands-resources (JD-R) (Bakker & Demerouti, 2007, 2008) model and self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), we investigated the role of work-related needs (autonomy, competence, and relatedness) in mediating the effects of job resources, namely, social support, influence in decision-making, and job demands, on work engagement. Testing the mediating role of work-related needs within the context of an intervention extends recent work identifying positive relationships between resources, needs, and work engagement (Van den Broeck, Ferris, Chang, & Rosen, 2016). In this introduction, we first describe the context of the intervention before reviewing work engagement and interventions to increase work engagement. We then move on to discuss participatory interventions in particular, and finally SDT as a mediating mechanism underlying our intervention.

Intervention context

Within the NHS, there is a long history of poor care of older people in particular, and focus on this issue has recently intensified in the government and media. For example, the Mid-Staffordshire NHS Foundation Trust Public Inquiry investigated how standards of care deteriorated so severely between 2005 and 2009 (Francis, 2013) and highlighted how vulnerable, older people suffered due to "a lack of care, compassion, humanity and [management] leadership" in which "the most basic standards of care were not observed, and fundamental rights to dignity were not respected" (Francis, 2013). Examples included patients being left unwashed, unfed, and dehydrated. In response, Francis suggested that a change in NHS culture was essential, from top-down managerial strategies focused on corporate matters and cost efficiency to bottom-

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up strategies placing the patient at the centre of care. More recently, similar issues to those uncovered by the Francis report have continued to be reported in the NHS (Burchardt & Vizard, 2015).

Against this backdrop, healthcare staff who work with older people have reported a lack of significance, purpose, and reward in their jobs due to the long-term nature of illnesses in older people and the likelihood of progressive deterioration as opposed to improvement (Patterson et al., 2011). Over and above other patient groups, student nurses have described caring for older patients as "difficult", "depressing", "boring", and "not challenging", with little job satisfaction or reward (Nolan, Brown, Davies, Nolan, & Keady, 2006). Furthermore, Nolan and colleagues noted the continued existence of ageism, prejudice, and impoverished environments characterized by poor conditions, attitudes, and standards of care. Other reports have revealed similar findings (e.g., Cooper, Selwood, & Livingston, 2008; Hanson, 2014; Higgins, Der Riet, Slater, & Peek, 2007; Mullan, 2009), with further research pinpointing the negative impact of diminished resources on care for older people, highlighting the practical issues faced by nurses in these environments (Adibelli & Kılıç, 2013). Taken together, these reports suggest that working on wards where older people are cared for may be considered particularly difficult and challenging and be associated with low staff motivation and morale.

Increasing work engagement, an indicator of work motivation (see later), is one route to improving the negative experiences of healthcare workers caring for older people on hospital wards. A very recent systematic review (Keyko, Cummings, Yonge, & Wong, 2016) extensively explored the relationships between antecedents of work engagement and outcomes within the context of professional nursing practice and highlighted the importance of work engagement for quality of care, voice behaviour, patient satisfaction, work effectiveness, and productivity. Other reviews support these findings (e.g., Bailey, Madden, Alfes, & Fletcher, 2015; Bargagliotti, 2012), and a number of empirical studies in healthcare settings have also noted the importance of participation in decision-making, training, trust in a manager, and authentic leadership for work engagement, quality of care, and safety outcomes (Laschinger & Leiter, 2006; Saka, A. M. 2006; Shantz, Alfes, & Arevshatian, 2016; Wong, Lashinger, & Cummings, 2010). Taken together, these findings suggest that an intervention designed to increase the work engagement of healthcare workers will be particularly successful and appropriate on hospital wards where older people are cared for.

Work engagement

Work engagement is commonly defined in terms of vigour, dedication, and absorption in one's work tasks (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002). Other definitions exist (e.g., Kahn, 1990; Maslach & Leiter, 1997; May, Gilson, & Harter, 2004; Saks, 2006), and debate persists over the meaning and distinctiveness of the concept (for a review, see Macey & Schneider, 2008); however, Schaufeli and colleagues' conceptualization is currently the most dominant and researched in the literature (Bailey et al., 2015). Indeed, a vast literature on work engagement has amassed over the previous two decades, led by both academics and practitioners (e.g., Bailey et al., 2015; MacLeod & Clarke, 2009). This interest has been driven by numerous theoretical models and empirical studies which have indicated relationships between resources in the work environment, such as social support, autonomy, and feedback, the work engagement of employees, and individual and organizational outcomes such as well-being, organizational commitment, performance, turnover intentions (Christian, Garza, & Slaughter, 2011; Halbesleben, 2010), and safety outcomes (Nahrgang, Morgeson, & Hofmann, 2011). These studies suggest high generalizability and the importance of boosting and sustaining work engagement for individual and organizational outcomes.

Work engagement interventions

In the last few years, several interventions to increase engagement have emerged. A recent systematic review and meta-analysis of Knight et al. (2016) identified 20 such interventions and found a positive, significant overall effect of work engagement, and a medium-to-strong effect of group interventions. Their taxonomy of interventions noted four types: (1) personal resource building, (2) job resource building, (3) leadership training, and (4) health promoting. Almost exclusively, these focused on engagement from the perspective of Schaufeli et al. (2002) and thus were grounded in JD-R (Bakker & Demerouti, 2007, 2008) theory. In accordance with this theory, personal resource-building interventions focused on promoting positive self-evaluations and resiliency; job resource-building interventions focused on increasing physical, social, or organizational aspects of the job, such as feedback, social support, and developmental opportunities; and leadership training interventions comprised skill and knowledge building workshops for managers and measured work engagement in their direct employees. Health-promoting interventions encouraged employees to consider healthier lifestyles and incorporated strategies such as exercise and mindfulness training.

Results of individual studies within all four types of interventions were mixed (Knight et al., 2016); however, the overall positive effect of these interventions suggests their utility. In particular, one job resource intervention was conducted with community nurses and demonstrated a significant, positive effect, suggesting the utility of applying work engagement interventions to care settings (Naruse et al., 2014). This particular intervention concluded that by implementing a skill-mix programme, in which an assistant was offered to home-visiting nurses, quality of care was positively impacted, as well as work engagement and nurses' sense of being meaningful to their patients. This finding suggests that increasing the job resources of nursing staff may offer a means of buffering against the impact of limited resources and budget cuts within the NHS on healthcare workers' well-being and work engagement.

In the next section, we discuss participatory interventions that promote resources such as social support and influence in decision-making and are likely to work particularly well within hospital environments in which the team-based nature of

healthcare work emphasizes employee collaboration, support, and the development of shared aims and goals (Patterson et al., 2011). To the best of our knowledge, no previous participatory interventions aimed at improving work engagement have been conducted in this environment.

Participatory action interventions

Participatory action research (PAR; Lewin, 1946; McTaggart, 1991) interventions aim to solve problems identified by those who actually work in the context studied through a cyclical process whereby employees and researchers together define issues or problems, collect data to inform the problem, identify suitable intervention strategies, implement those interventions, and evaluate the results. This approach has recently been applied to stress management research. Egan, Bambra, Petticrew, and Whitehead (2009) found that 12 of 18 participatory, controlled, organizational-level occupational health interventions were associated with positive outcomes, and individual studies report the successful reduction of symptoms of depression, absenteeism, psychosomatic complaints, and work-related stress, as well as the increase of performance (see Le Blanc, Hox, Schaufeli, Taris, & Peeters, 2007). In accordance with Karasek's demands-control model (1979), the active involvement of employees in the decision-making process may increase their perception of job control and decrease job-related strain (stress).

More specifically, the PAR approach has been used successfully to reduce burnout in oncology ward staff in The Netherlands. Le Blanc and colleagues (2007) found that the job resources, social support and job control, and a key job demand, workload, were significantly related to changes in burnout on the experimental wards in comparison with the control wards. Their results also suggested that the team-based nature of the intervention had a positive effect on those who didn't actually take part, extending the reach of the intervention beyond the participating individuals. This may be due to the verbal transfer of knowledge, and the transfer of a sense of well-being to others, in line with contagion theory (Bakker, 2011). Furthermore, they suggested applying PAR to address other issues within organizations, such as collective engagement and problem solving.

Le Blanc and colleagues' study suggests that changing the job characteristics of the work environment is one mechanism underpinning participative job redesign interventions. Support for this mechanism comes from a recent study by Holman and Axtell (2016). They found that a participatory intervention with call centre staff to improve outcomes such as employee well-being and performance worked by changing individuals' perception of job control and feedback. Thus, job resources were able to mediate between intervention participation and positive outcomes. Based on JD-R theory, it is likely that work engagement will increase as a result of a participatory intervention designed to increase job resources.

Further, in a team-based intervention in the elder care sector, Nielsen and Randall (2012) found that actively involving employees in the change process was important for gaining and maintaining the commitment of employees to the intervention. In particular, they found that those who had participated in the team intervention perceived changes in work procedures, and that participation and changes in procedures were related to autonomy, social support, and well-being post-intervention. These changes in existing procedures, such as problem-solving processes, may explain how team-based interventions work. Given that nursing environments on NHS hospital wards are similarly team based, with team members relying on each other to work together to solve problems and provide high-quality care, it is likely that a similar participatory approach, which develops resources such as social support and involvement in decision-making, will be particularly appropriate for increasing the work engagement of nursing staff caring for older people on acute wards. The first hypothesis of this study is therefore as follows:

Hypothesis 1: A team-based, participatory action research intervention with nursing staff caring for older people on acute NHS wards will significantly increase individuals' work engagement post-intervention, compared to a control group.

SDT as a mediating mechanism

The second aim of this study is to investigate the underlying mechanisms through which the intervention might work. We have argued that participating in our intervention will lead to positive changes in work engagement as employees will experience enhanced job resources. In addition to accentuating the importance of job resources for work engagement, JD-R theory also proposes that the satisfaction of the three needs of SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), autonomy, competence, and relatedness, mediates the effect of job resources on work engagement (Bakker & Demerouti, 2007, 2008; Van den Broeck, Vansteenkiste, de Witte, & Lens, 2008; Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010). More specifically, JD-R theory argues that job resources, which fulfil basic psychological needs for autonomy (experiencing choice and a sense of freedom), competence (succeeding at challenging tasks and achieving goals), and relatedness (a sense of belonging with others), are motivating and enable individuals to meet work goals, thus promoting work engagement. Van den Broeck and colleagues' large meta-analysis involving 99 studies supports this theory, finding that personal resources, including self-esteem and optimism, and job resources, including social support, job autonomy, and feedback, were related to each of the three needs and work engagement. We propose that the intervention described here will work through the mediating potential of work-related needs and thus that the job resources reflected in the principles of our intervention, social support and influence in decision-making, will increase work engagement through the satisfaction of these needs (Figure 1).

A PAR intervention which develops social support by allowing colleagues the opportunity to share experiences, voice opinions, and help each other to implement changes is likely to enhance the satisfaction of autonomy, competence, and relatedness in a number of ways (Nielsen, 2013). Autonomy is anticipated to increase as new ways of working are

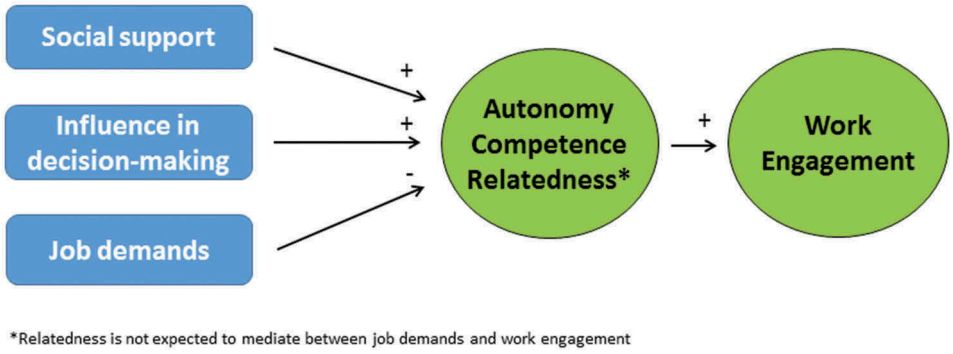

Figure 1. The research model, displaying the hypothesized relationships between job resources, work-related needs, work engagement, and well-being.

collaboratively established which individuals can effect in ways they feel most appropriate in their daily jobs, creating a sense of job control (Holman & Axtell, 2016). Competence would plausibly increase as positive feedback from others towards one's ideas in a supportive environment could engender a sense of ability. Social exchange theory can explain this as individuals who feel supported by colleagues are likely to reciprocate support by taking on more responsibility and performing extra-role behaviours (Nielsen & Randall, 2012). The learning and self-development which results could increase self-efficacy and competence. Gaining feedback from others is also likely to be important in this process, with increases in the frequency of feedback being noted as a positive outcome of previous participative job redesign interventions (Holman & Axtell, 2016). Feedback has also been repeatedly associated with work engagement (Halbesleben, 2010) and competence (Van den Broeck et al., 2016), and hence the opportunity provided by peer support for feedback could be important. Finally, relatedness is expected to increase following the development of colleague social support as work colleagues have the opportunity to learn about each other and build working relationships, developing individuals' sense of belonging to ward teams.

Furthermore, and in accordance with social identity theory (SIT), Nielsen (2013) posits that individuals who define themselves as belonging to a particular group perceive a positive impact on well-being, due to the sense of group cohesion, direction, and purpose created by that group membership. Participating ward team members are therefore likely to experience this sense of belonging, leading to increased relatedness. Three specific hypotheses relating to social support will therefore be tested:

Hypothesis 2a: Autonomy will positively mediate the relationship between the participatory intervention and social support, and work engagement.

Hypothesis 2b: Competence will positively mediate the relationship between the participatory intervention and social support, and work engagement.

Hypothesis 2c: Relatedness will positively mediate the relationship between the participatory intervention and social support, and work engagement.

Enhanced participation in decision-making as a result of the intervention is likely to lead to the satisfaction of autonomy because individuals have the opportunity to voice an opinion and make an impact (Bakker & Demerouti, 2007). This is evidenced by a participatory intervention to reduce burnout (Hatinen, Kinnunen, Pekkonen, & Kalimo, 2007). The sense of feeling heard and valued could increase self-esteem and self-efficacy, and therefore competence, and the opportunity to discuss views and opinions with others could lead to the building of colleague relationships and a sense of relatedness. Park et al. (2004) found that participation in a problem-solving intervention was positively related to organizational social climate and interactions with colleagues and supervisors, and Lines (2004) found that employee involvement during change was associated with decreased resistance to that change, goal achievement, and organizational belonging. In addition, Nielsen, Randall, and Albertsen (2007) found that employees who were able to influence the content of an intervention were more likely to participate, increasing job satisfaction and decreasing behavioural stress symptoms.

More specifically, participation in the intervention may work to increase involvement in decision-making, work-related needs, and work engagement, through the increased ability of individuals to make changes to their physical work environments, or their cognitive attitudes and beliefs towards work (job crafting; Wrzesniewski & Dutton, 2001). Support for this process comes from recent interventions which have found increases in performance feedback, opportunities for professional development, self-efficacy, and performance, following the development of job crafting behaviours as a result of intervention participation (van Wingerden, Bakker, & Derks, 2016). Through participating in our intervention, individuals could collectively question existing work practices, engage in collective decision-making, collectively craft changes on wards, and in so doing, collectively and positively change the way work is done. It is therefore expected that our participatory intervention will increase individual's perceived ability to influence decision-making and have a positive impact on work engagement through the mediating effect of work-related needs. To our knowledge, the specific mediation relationships between participation in decision-making, needs, and work engagement have not been tested before in any study, intervention or otherwise. This study is therefore novel,

in that it aims to test these relationships in the context of a longitudinal relationship and need theory as an explanatory mechanism underlying the intervention and JD-R theory more generally. Three specific hypotheses will be assessed:

Hypothesis 2d: Autonomy will positively mediate the relationship between the participatory intervention and influence in decision-making, and work engagement.

Hypothesis 2e: Competence will positively mediate the relationship between the participatory intervention and influence in decision-making, and work engagement.

Hypothesis 2f: Relatedness will positively mediate the relationship between the participatory intervention and influence in decision-making, and work engagement.

Job demands are also likely to have an important role in the satisfaction of needs and the development of work engagement. Job demands include workload, time pressure, and emotional and cognitive demands (Bakker & Demerouti, 2007). When they are high, employees may feel overwhelmed and unable to meet them and experience negative outcomes such as stress and burnout. For example, without enough staff on a hospital ward, it may not be possible to attend to patient needs for food, water, and cleanliness, in a timely manner, which is likely to make individuals feel incompetent, unable to control their work environment, and lead to feelings of being undervalued and under resourced (Davies, Nolan, Brown, & Wilson, 1999; Francis, 2013). Indeed, Van den Broeck and colleagues' (2016) meta-analysis found that the job demands, workload, and emotional demands were negatively related to autonomy and competence, and unrelated to relatedness. We expect that job demands will decrease as a result of our intervention, leading to the satisfaction of autonomy and competence (Figure 1). In accordance with JD-R theory (Bakker & Demerouti, 2007, 2008), decreasing job demands is likely to prevent negative outcomes and allow activation of the motivational pathway between resources, needs, and engagement. Our final two hypotheses are therefore as follows:

Hypothesis 2g: Autonomy will negatively mediate the relationship between the participatory intervention and job demands, and work engagement.

Hypothesis 2h: Competence will negatively mediate the relationship between the participatory intervention and job demands, and work engagement.

Method

Design

A non-randomized, matched control group, pretest, post-test quasi-experimental design was employed in which six intervention and six control acute care wards for older people within two hospitals of a large NHS Foundation Trust in the United Kingdom were invited to take part. All wards were invited to complete a baseline (Time 1) and post-intervention (Time 2) questionnaire. This study was part of a wider study to increase the quality of patient care.

Participants

The target population consisted of nursing staff on each of the wards invited to take part. The wards were recruited through careful and lengthy negotiation between the research team, senior management, and nursing staff and were matched as far as possible according to ward type and patient age. At Time 1, 179 people completed the questionnaire (37% response rate), 64.2% of which (n = 115) worked on the intervention wards and 35.8% (n = 64) worked on the control wards. A percentage of 88.3 of the whole sample were female (n = 158) and the mean age was 37.8 years (SD = 11.28). A percentage of 53.2 of the sample were ward managers and staff nurses (n = 93), 40% were healthcare assistants (n = 70), and 6.8% (n = 12) had other roles such as deputy ward manager or clinical support (n = 12). On average, respondents had been working on their respective wards for 3.1 years (SD = 3.06) and 71% were full time. A percentage of 28.5 were educated to diploma level and 27.4% to degree level.

The participatory action intervention

The research team consisted of three experienced nurse practitioners with expertise in gerontological nursing and PAR techniques, a full-time research assistant with vast experience of working within the NHS, and three academic consultants and researchers, who constructed and developed the questionnaires and conducted statistical analyses. The nurse-practitioners led the workshops alongside the research assistant, who also collected questionnaire data and worked daily on the wards to build trust, motivation, and support for the intervention, in accordance with recommendations in the literature for developing close researcher–organization relationships (e.g., Briner & Walshe, 2016; Nielsen, 2013; Nielsen, Taris, & Cox, 2010).

A launch event in June 2014 marked the start of the study. This involved a half-day workshop in which representatives (nurses, ward managers, and healthcare workers) from each of the intervention wards were introduced to the research team, and the theory and rationale behind the study. Following this, all staff on the participating wards were invited to complete a pen-and-paper questionnaire (July–September 2014). The intervention consisted of five core workshops (September 2014–May 2015); one 3-day workshop and four 2-day workshops (Figure 2). The length of time between workshops was designed to allow sufficient time for the transference of knowledge between workshop participants and the rest of the ward staff as well as for change to be effected whilst maintaining continuity between workshops. Three representatives from each intervention ward (a ward manager, senior nurse, and healthcare assistant) were invited to attend these workshops. As some ward managers represented more than 1 ward, the total number of workshop invitees reached 16.

Communities of Practice workshops were held in between the core workshops to help maintain momentum; one was for ward managers, one was for senior nurses, and one was for

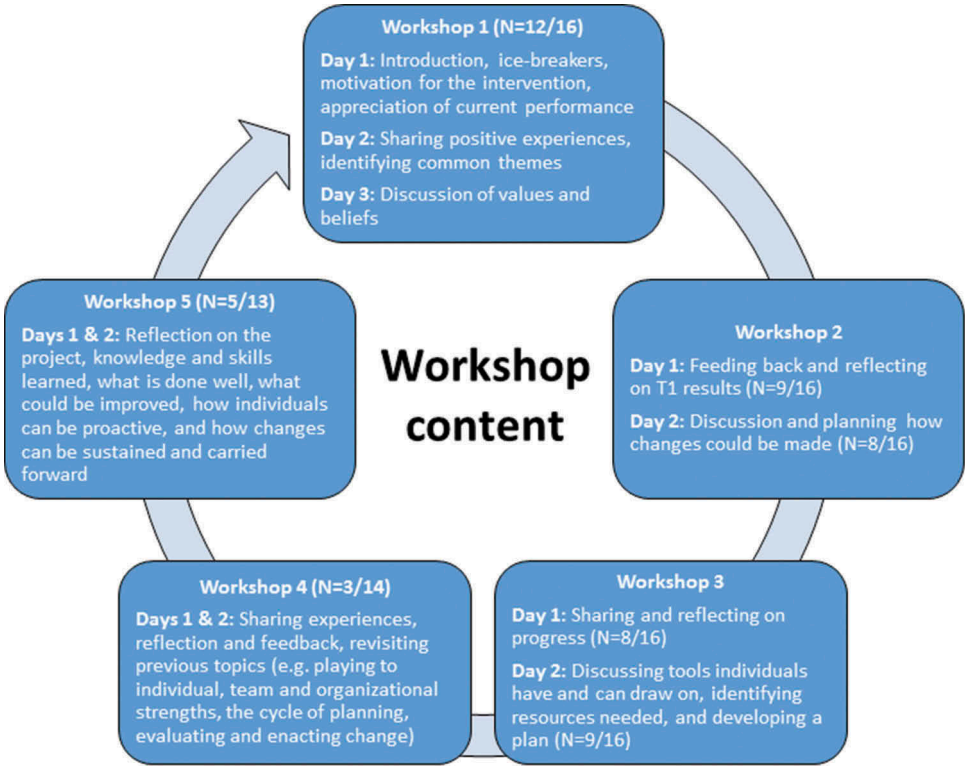

Figure 2. An outline of the content of the five core workshops.

healthcare assistants. These allowed participants from each of the wards to collaborate in peer groups, facilitating discussion, reflection, and the generation of ideas. In particular, these workshops aimed to discuss the progress of the intervention, including the success of changes made and any problems and issues that may have emerged. Workshop participants were tasked with transferring their knowledge, ideas, and enthusiasm to the rest of the healthcare staff on their wards (staff numbers ranged between 26 and 40 on each intervention ward), thus implementing the intervention ward-wide. This was important so that all employees could become involved in the intervention and be impacted by potential changes in resources. Interventions which involve all employees are noted to have greater positive effects, possibly due to the individual learning acquired from participation (Nielsen & Randall, 2012). In reality, not all staff were able to attend each workshop, and some staff left and were replaced. Attendance rates are provided in Figure 2 and reflect the decrease in total number of workshop invitees as the intervention progressed, from 16 to 13, due to wards leaving the study. A Time 2 questionnaire was circulated in June/July 2015, with a £25 Amazon voucher offered as an incentive per ward. A celebration event took place in November 2015 to mark the official end of the study.

Measures

Demographic data

Data collected included age, gender, ward and hospital tenure, job role, education, number of years qualified, whether or not individuals managed others, and whether or not individuals worked full time or part time.

Social support

A four-item scale previously validated for use in health service settings on a sample of over 9,000 NHS staff (Haynes, Wall, Bolden, Stride & Rick, 1999). A sample item is: "To what extent can you count on your colleagues at work to listen to you when you need to talk about problems at work?". All items were scored on a 5-point scale (1 = Not at all, 5 = Completely, Cronbach's α = .90). Following staff feedback that two items were very similar, and confirmatory factor analysis (CFA) of the Time 1 results, one item was removed. The final three-item scale, which was the factor analysed together with the influence in decision-making scale presented later, revealed a very good model fit (N = 179, $\chi^2(8)$ = 9.047, p = .338, CMIN/df = 1.13, CFI = 1.00, RMSEA = .03, SRMR = .035).

Influence in decision-making

A four-item measure developed for use in health service settings (Haynes, Wall, Bolden, & Stride, 1999). A sample item is: "To what extent are you allowed to participate in decisions which affect you?". Each item was scored on a 5-point scale (1 = "Not at all", 5 = "A great deal", α = .84). Similar to the social support scale, one item was removed following staff feedback and CFA of the Time 1 results.

Job demands

A four-item measure developed for use in health service settings (Patterson et al., 2011) and validated specifically on health service employees caring for older people on NHS wards. A sample item is: "There is too much to do in too little time". Each item was scored on a 5-point scale (1 = "Strongly disagree", 5 = "Strongly agree", α = .83).

Work-related basic needs (autonomy, competence, and relatedness)

This was measured using an abbreviated 9-item version of the 18-item Work-related Basic Needs Scale (Van den Broeck et al., 2010). Sample items are: "I feel free to do my job the way I think it could best be done" (autonomy, α = .84); "I feel competent at my job" (competence, α = .82); "At work, I feel part of a team" (relatedness, α = .76). All items were scored on a 5-point Likert scale (1 = "Totally disagree" to 5 = "Totally agree"). This scale has demonstrated good psychometric properties (Van den Broeck et al., 2010). It was reduced to nine items based on correspondence with Anja Van den Broeck during May and June 2014, and factor analysis results presented in Van den Broeck et al. (2010). Subsequently, only the positively worded scale items of the original scale were included. A score was created for each subcomponent separately, as opposed to creating an overall sum score, in accordance with recommendations by Van den Broeck et al. (2010, 2016) who argue that each of the subcomponents are distinct concepts.

Work engagement (vigour, dedication, and absorption)

The nine-item abbreviated version of the Utrecht Work Engagement Scale (Schaufeli, Bakker, & Salanova, 2006) was employed. This scale has been used extensively across occupations and countries and has consistently demonstrated acceptable reliability (Schaufeli et al., 2006). Example items are: "I am enthusiastic about my work" (vigour); "When I get up in the morning, I feel like going to work" (dedication); "I am immersed in my work" (absorption). All items were scored on a 7-point scale (1 = "Never", 7 = "Always", α = .91). In accordance with Schaufeli and colleagues' recommendations, a sum score was created, as opposed to creating scores for each subcomponent separately (Schaufeli et al., 2006). The Utrecht Work Engagement Scale (UWES) was adopted as Schaufeli and colleagues' conceptualization of engagement has received the most empirical support to date (Bailey et al., 2015; Hakanan & Roodt, 2010), and their associated measurement scale is arguably the most reliable and valid scale which currently exists to measure this concept (see Schaufeli et al., 2002, for a thorough empirical analysis of the reliability and validity of this measure).

Statistical analysis

A total of 179 participants responded to the questionnaire at Time 1, and 83 at Time 2. Forty-five participants responded at both Time 1 and Time 2 and formed the matched sample. Repeated measures ANOVA was used to analyse this matched sample. Due to the small sample size, decreasing the robustness of the results and the representativeness of the wards, multilevel modelling in SPSS was conducted to analyse the complete sample across both time points (N = 262). As multilevel modelling can take into account both repeated measures and between-subjects data in the same analysis, data from both matched and unmatched respondents (those who had responded at *either* Time 1 *or* Time 2) could be analysed together.

To explore the psychological mechanisms underpinning the intervention, we intended to conduct mediation analyses between intervention participation, job resources, work-related needs, and work engagement, using the PROCESS macro (Hayes, 2013), Model 6, following the guidelines outlined by MacKinnon, Coxe, and Baraldi (2012). This procedure allows indirect mediation relationships to be tested via 1000 bias-corrected bootstrapped 95% confidence intervals (CI) and significant results are indicated by CI which do not span zero.

In practice, we used the unmatched sample to increase the robustness of our results (N = 217) as the sample size of the matched sample was limited. The unmatched sample comprised all those who responded at Time 1 (N = 179), as well as those who responded at Time 2 who did not also respond at Time 1 (N = 38). It was not possible to use the complete sample (N = 262) due to the non-independence of included data from the matched sample. Initially, we applied our original planned procedure to the unmatched sample, to check that simply being in the intervention group did *not* predict job resources, needs, and work engagement. This was expected as we were no longer testing the effect of the intervention across time. We then tested the general mediation relationships between resources, work-related needs, and work engagement espoused in the literature, using the PROCESS macro, Model 4, by removing intervention participation as a predictor. This enabled us to partially test the indirect relationships stated in Hypothesis 2a–h and contribute generally to the literature on JD-R theory and SDT as a proposed underlying psychological mechanism. To assess the size of the effects, the absolute indirect effect size (ab_{cs}) and the relative indirect effect size (P_M) were computed. ab_{cs} is a standardized measure of the indirect effect size, and P_M is an unstandardized measure which assesses the ratio of the indirect effect to the total effect. Despite criticisms, these are two of the most widely used measures of effect size, and no better effect size measures have yet been proposed (Preacher & Kelley, 2011).

Results

The demographic characteristics of the Time 2 sample (N = 83) were very similar to the Time 1 sample (N = 179; see "Method" section). Means and standard deviations (SD) of the research variables for the control and intervention groups of the complete sample at Time 1 and Time 2 can be found in Table 1 for the complete sample and in Table 2 for the matched sample. For the complete sample, these demonstrate that the intervention mean for work engagement increases following the intervention (Time 1 mean = 5.43, SD = 1.21; Time 2 mean = 5.70, SD = .94), supporting Hypothesis 1. For both samples, baseline work engagement is higher for the intervention group than the control group. Table 3 displays the correlations between all of the research variables.

Analysis of intervention effectiveness using the matched sample

Independent samples t-tests of the matched sample (N = 45) revealed significant differences between the intervention and control groups at Time 1 for several

Table 1. Means and standard deviations (SD) of the research variables for the intervention (I) and control (C) groups of the complete sample at Time 1 (N = 179) and Time 2 (N = 83).

	Time 1						Time 2					
	N		Mean		SD		*N*		Mean		SD	
Variables[a]	I	C	I	C	I	C	I	C	I	C	I	C
Colleague support	113	64	3.59	3.66	.97	.89	43	40	4.13	3.54	.84	.96
Influence in decision-making	114	64	2.86	2.79	.98	1.03	43	40	3.19	2.98	.81	.98
Job demands	115	64	3.41	3.43	.91	.85	42	40	3.00	3.34	.95	.72
Autonomy	113	63	3.90	3.75	.73	.86	41	39	4.26	3.91	.50	.87
Competence	112	63	3.92	3.79	.74	.91	42	39	4.20	3.88	.58	.69
Relatedness	112	63	4.32	4.19	.56	.60	42	39	4.30	4.16	.48	.52
Work engagement	110	64	5.43	5.30	1.21	1.39	40	38	5.70	4.76	.94	1.49

[a]The variables colleague support, influence in decision-making, and job demands were scored on a scale of 1–5. All other variables were scored on a scale of 1–7. For all scales, higher scores indicate better results.
N: = Number of respondents; SD: standard deviation of the mean; SE: standard error of the mean; min: minimum value; max: maximum value; C: control group; I: intervention group.

Table 2. Means and standard deviations (SD) of the research variables for the intervention (I) and control (C) groups of the matched sample at Time 1 and Time 2 (N = 45).

	Time 1						Time 2					
	N		Mean		SD		*N*		Mean		SD	
Variables[a]	I	C	I	C	I	C	I	C	I	C	I	C
Colleague support	31	14	4.02	3.48	.77	1.08	31	14	4.11	3.76	.84	.80
Influence in decision-making	31	14	3.09	2.79	.97	.77	31	14	3.13	3.17	.89	.52
Job demands	31	14	2.72	2.56	.95	.78	30	14	3.00	2.67	1.01	.57
Autonomy	31	14	4.16	3.62	.54	1.03	30	14	4.24	4.02	.51	.48
Competence	30	14	4.36	3.90	.56	.95	31	14	4.33	4.24	.49	.48
Relatedness	30	14	4.20	3.43	.65	.10	31	14	4.20	4.04	.56	.29
Work engagement	30	14	6.12	5.02	.77	1.61	30	13	5.76	5.08	.86	1.40

[a]The variables colleague support, influence in decision-making, and job demands were scored on a scale of 1–5. All other variables were scored on a scale of 1–7. For all scales, higher scores indicate better results.
N: Number of respondents; SD: standard deviation of the mean; SE: standard error of the mean; min: minimum value; max: maximum value; C: control group; I: intervention group.

Table 3. Bivariate Pearson's correlations between all of the research variables or the complete sample at Time 1 (N = 179) and Time 2 (N = 83).

		1	2	3	4	5	6	7
1	**Colleague support**	1.00	.47**	−.38**	.43**	.56**	.25*	.40**
2	**Influence in decision-making**	.34**	1.00	−.45**	.45**	.51**	.41**	.43**
3	**Job demands**	−.07	−.25**	1.00	−.41**	−.27*	−.30**	−.42**
4	**Autonomy**	.31**	.39**	−.31**	1.00	.63**	.58**	.52**
5	**Competence**	.40**	.37**	−.03	.58**	1.00	.50**	.40**
6	**Relatedness**	.16*	.18*	−.02	.51**	.37**	1.00	.36**
7	**Work engagement**	.31**	.32**	−.14	.51**	.37**	.28**	1.00

Time 1 correlations are below the diagonal and Time 2 correlations are above the diagonal.
**Correlation is significant at the .01 level (two-tailed).
*Correlation is significant at the .05 level (two-tailed).

demographic variables: gender (equal variances not assumed, mean difference = .13, $t(30) = 2.11$, $p = .043$); ward tenure (equal variances not assumed, mean difference = −2.72, $t(17.13) = -2.31$, $p = .033$); role (equal variances assumed, mean difference = −.53, $t(42) = -.60$, $p = .05$); and whether or not the respondent managed other employees (equal variances assumed, mean difference = −.34, $t(39) = -2.17$, $p = .04$). Ideally, all four control variables would have been included in subsequent analysis. However, with a very small sample, this would have decreased the power to detect an effect even further; therefore as a compromise, we first included all four in an ANCOVA to determine which, if any, had independent significant relationships with baseline work engagement. We used backwards elimination to ensure only a set of significant predictors were retained. Only one predictor, role, remained significant ($F(3, 39) = 3.75$, $p = .018$) and was kept in the model, and therefore, this was the only control variable we retained for subsequent repeated measures ANOVAs. *Post-hoc* comparisons, with Bonferroni adjustment, revealed that healthcare assistants reported significantly higher work engagement at Time 1 (mean = 6.10, SD = .72) than people in "other" roles (mean = 4.25, SD = .77). Role was therefore included as a control in all of the repeated measures ANOVAs.

Repeated measures ANOVA, controlling for role, revealed a significant difference between intervention and control groups at Time 1 and 2 for the work-related basic need, relatedness, $F(1, 40) = 7.30$, $p = .010$. Inspection of the profile plot of the estimated marginal means for both groups indicates that the results were not in the expected direction. Figure 3 demonstrates that there was

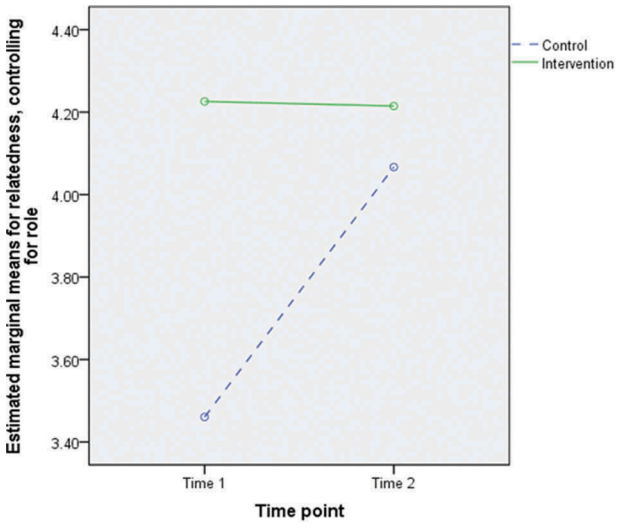

Figure 3. A profile plot comparing the estimated marginal means for relatedness, controlling for role, between Time 1 and Time 2 for the control and intervention groups.

a significantly greater increase in relatedness, on average, for the control group than for the intervention group when controlling for role and that the mean of the intervention group slightly decreased between time points. A borderline significant difference was observed for competence, F (1, 40) = 3.23, p = .080, and, again, the results were not in the expected direction (Figure 4). No other significant differences were observed. The descriptive statistics support these results, indicating that the means for relatedness and competence decreased in the intervention group post-intervention compared to baseline, and also indicate that the mean for work engagement decreased. However, the means for colleague support, influence in decision-making, job demands, and autonomy increased slightly, indicating positive, albeit insignificant, improvement.

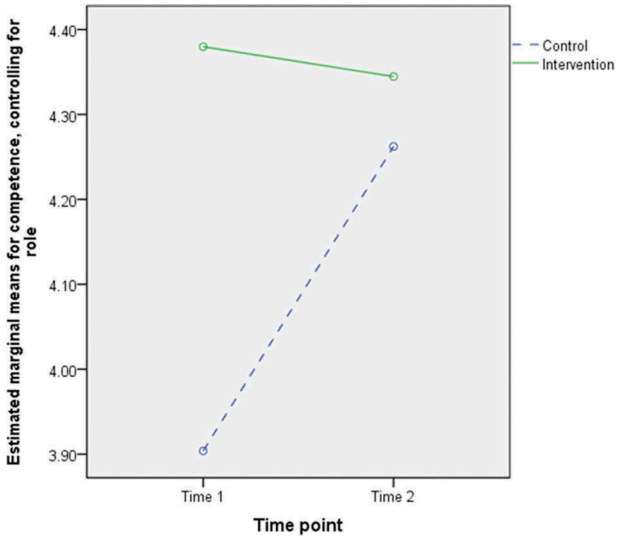

Figure 4. A profile plot comparing the estimated marginal means for competence, controlling for role, between Time 1 and Time 2 for the control and intervention groups.

Analysis of intervention effectiveness using the complete sample

Independent samples t-tests of the complete sample (N = 262) revealed significant differences between intervention and control groups at Time 1 for ward tenure (equal variances not assumed, mean difference = 1.51, t = 2.31 df = 89.73, p = .023, 95% CI, LL = .21, UL = 2.80) and hospital tenure (equal variances not assumed, mean difference = 2.36, t = −2.30 df = 107.95, p = .023, 95% CI, LL = .33, UL = 4.40). As these two variables are strongly correlated (r = .61), including both as controls could violate the assumption of non-multicollinearity necessary for multilevel analyses, therefore only the variable with the largest mean difference, hospital tenure, was included as a control. No significant differences were observed for any other demographic or research variables. Results of multilevel analysis, adopting the maximum likelihood method of estimation, and controlling for hospital tenure, revealed that there were no significant differences between control and intervention groups between Time 1 and Time 2 for any of the variables. As no significant differences were observed for work engagement using either the matched or complete samples; Hypothesis 1 was not supported.

Additional analyses

As we did not find an effect of our intervention on work engagement using either the matched or complete samples, we investigated whether there was an effect across certain subgroups. We are aware that it is controversial to conduct *post-hoc* analyses which were not specified a priori due to the risk of "data mining" and Type I error. This is in accordance with Moher et al. (2012) updated guidelines for reporting group trials based on the CONSORT 2010 Statement (Schulz, Altman, & Moher, 2010). Moher et al. (2012) explicitly state under Item 18 the issue of "false positive findings" (p. 19) generated by "multiple analyses of the same data" (p. 19), due to the biased results they can create, and recommend researchers "resist the temptation to perform many subgroup analyses" (p. 19). Bearing this in mind, we cautiously conducted a limited number of subgroup analyses on the complete sample (N = 262).

Based on findings from other studies (e.g., Imamura et al, 2017; Ouweneel, Le Blanc & Schaufeli, 201), we hypothesized that those initially low in engagement might have benefitted more from the intervention than those initially high in engagement, which would support the view that pre-assessments are needed to focus interventions towards those who need it most (Briner & Walshe, 2015). Following Imamura and colleagues' (2016) procedure, we created high and low work engagement groups based on the baseline median work engagement score (baseline median = 5.61). We proceeded to test the three way interaction between the intervention and control groups, the high and low engagement groups, and time, using Multilevel Modelling in SPSS. It was not significant, suggesting that one group did not benefit more than the other from the intervention in terms of work engagement.

We also investigated subgroup differences according to the five controls which we included in one or other of our primary analyses. For ward and hospital tenure, we again created high

and low groups based on the baseline median results (baseline median ward tenure = 1.83 years; baseline median hospital tenure = 2.80 years). For our categorical variables, gender (male vs. female), job role (sister/charge nurse vs. staff nurse vs. healthcare worker vs. "other"), and whether or not respondents managed other staff (yes vs. no), categories were already specified. Following a test of the three-way interaction for each control variable, no significant differences between subgroups were observed for work engagement. A result could not be computed for gender as there were no males in the control group at Time 2. This was not surprising as the nursing profession generally is predominantly female. Although the lack of males in the Time 2 control group also prevented us conducting the analysis using the male subgroup only, we did test the female subgroup separately. A significant effect was not observed. We did not investigate the effect of subgroups within the matched sample due to the small sample size (N = 45), the decreased robustness of any results obtained, and our reluctance to unduly increase the Type I error rate by conducting large numbers of subgroup analyses.

In summary, none of our additional subgroup analyses were significant which may be due to the nature of our sample, which combined matched and non-matched data, decreasing the power of the test to detect an effect. We do not believe that it is appropriate to interpret these results any further, or to conduct further subgroup analyses, given the risks associated with conducting numerous subgroup analyses which we outlined earlier.

Mediation analyses of the relationships between job resources, job demands, work-related needs, and work engagement

Mediation analyses examined the relationships between participation intervention, job resources, work-related needs, and work engagement using the unmatched sample (N = 217). Independent samples t-tests were conducted to investigate if there were systematic differences between the Time 1 and 2 samples which might indicate bias. Significant differences were observed for work engagement (mean difference = .52, $t(207) = 2.156$, $p = .032$, 95% CI, LL, .04, UL, 1.00), with respondents at Time 1 (mean = 5.39, SD = 1.27) reporting higher work engagement than those at Time 2 (mean = 4.86, SD = 1.48), and between men and women in terms of resources and demands (mean difference = .37, $t(209) = 2.095$, $p = .037$, 95% CI, LL, .02, UL, .71), autonomy (mean difference = .52, $t(207) = 2.716$, $p = .007$, 95% CI, LL, .14, UL, .89), and relatedness (mean difference = .60, $t(206) = 3.193$, $p = .002$, 95% CI, LL, .23, UL, .97), with females reporting higher scores than males in all cases. Due to these results, both age and gender were entered as control variables in the mediation models.

The results of simple mediation analyses, entering intervention participation, one job resource, one work-related need, and the outcome, work engagement, in each analysis, revealed no significant indirect effects, as expected. However, significant effects were observed when intervention participation was removed as a predictor. Autonomy, competence, and relatedness significantly mediated the relationships between social support and influence in decision-making, and work engagement, when controlling for time and gender. These results partially support Hypothesis 2a–f. In each of these cases, the effect of the predictor on the outcome variable was not independent of its effect through the mediator (thus indicating mediation). Autonomy also significantly, and negatively, mediated the relationship between job demands and work engagement, partially supporting Hypothesis 2g (Table 4). Competence did not significantly mediate this relationship, suggesting that the effect of the predictor on the outcome variable was independent of its effect through the mediator. This does not support Hypothesis 2h.

Table 4. Results of simple mediation analyses to test for a mediation relationship between each predictor (a job resource), work-related need, and work engagement, controlling for time and gender, using the unmatched sample (N = 217).

Y	Relationship tested between…	ab	95% CI	ab_{cs}	P_M
1	…social support and work engagement, mediated by autonomy	.21	.11–.35	.16	.40
2	…influence in decision-making and work engagement, mediated by autonomy	.22	.12–.36	.17	.45
3	…job demands and work engagement, mediated by autonomy	−.21	−.35–−.12	−.16	.73
4	…social support and work engagement, mediated by competence	.05	.01–.15	.04	.10
5	…influence in decision-making and work engagement, mediated by competence	.05	.01–.15	.04	.11
6	…job demands and work engagement, mediated by competence	−.02	−.08–.04	n/a	n/a
7	…social support and work engagement, mediated by relatedness	.14	.05–.26	.10	.26
8	…influence in decision-making and work engagement, mediated by relatedness	.12	.05–.24	.09	.25

ab: Regression coefficient for the indirect relationship between a predictor, mediator (a work-related need), and the outcome variable, work engagement; 95% CI: 95% confidence interval; ab_{cs}: absolute indirect effect size; P_M: relative effect size.

The nature of the sample involved in these analyses necessitated including data from 12 respondents at Time 2 who were on the intervention wards and hence exposed to the intervention. To explore the potential bias this may have created, we carried out the same set of analyses with intervention participation included as a control alongside time and gender. No differences to the results reported earlier were observed, suggesting robustness. Nevertheless, some caution in interpreting these results should be reserved, and we welcome future research which explores these relationships on other samples and in different contexts.

The strongest absolute indirect effect size was observed for the relationship between influence in decision-making and work engagement mediated by autonomy (ab_{cs} = .17), and the weakest was observed for the relationship between both social support and influence in decision-making, and work engagement mediated by competence (ab_{cs} = .04 for both). The strongest relative effect was observed for the relationship between job demands and work engagement mediated by autonomy (P_M = .73) and the weakest relative effect was observed for the relationship between social support and work engagement mediated by competence (P_M = .10). Significant direct effects were also reported for all of the analyses revealing significant indirect effects, except one (that involving the effect of job demands on work engagement when controlling for autonomy). This suggests that the predictor has an effect on work

engagement which is not dependent on the effect of the predictor on work engagement through the mediator.

Discussion

The first aim of this study was to test whether a group-level PAR intervention with nursing staff caring for older people on acute care NHS wards is effective for increasing work engagement. Results of repeated measures ANOVA based on a matched sample (N = 45) were unexpected; there was a significant difference between intervention and control groups across time for the work-related basic need, relatedness, and a borderline significant difference for competence, with an increase in both being observed for the control group and a decrease for the intervention group. No effects were observed for work engagement.

The decrease in relatedness suggests that individuals in the intervention group felt significantly less connected to others than those in the control group did, between the pre- and post-intervention measurements. SIT has been used to help explain intervention effectiveness (Nielsen, 2013) and can be similarly employed here to interpret this counterintuitive finding. In terms of this intervention, the "in-group" could have been perceived to be those invited to attend intervention workshops, that is, those actively involved in the intervention. This could have led to a decreased sense of belonging, or relatedness, for those working on the intervention wards but not actively participating in the intervention, that is, members of the "out-group". Although the intention was for workshop participants to transfer their knowledge, enthusiasm, and intervention activities to the rest of their wards, this may not have happened in practice. Therefore, those in the "out" group may not have had the opportunity to develop a sense of togetherness with their ward team in the same way that those who were involved may have done, leading them to feel "left out", and decreasing their sense of belonging to the ward team.

An alternative explanation for the unexpected results, however, is that with only 45 cases, the statistical power of the ANOVA was not strong enough to detect effects in each of the research variables. The results may also have been biased due to the small sample size, rendering it unrepresentative of all of the nursing staff on the intervention and control wards present at both time points. The descriptive statistics also revealed that baseline work engagement for the intervention group was higher than that for the control group (Table 2), which may have caused bias and is likely due to intervention wards being targeted which managers had highlighted as motivated to participate. This may have made it more difficult to detect an effect. Another possibility is regression to the mean (Bland & Altman, 1994), which is discussed further in the limitations section.

The multilevel modelling techniques used to analyse the results offered a means of increasing the representativeness of all the nursing staff present on the wards involved, reducing potential bias and increasing statistical power. No effect on work engagement was observed, although the descriptive statistics revealed that the intervention mean for work engagement increased post-intervention compared to baseline (Table 1), supporting Hypothesis 1. It is likely that difficulties implementing the intervention prevented an effect from emerging. Several factors relating to implementation which are likely to have impacted the success of this intervention include attrition of wards (three of six intervention and five of six control wards completed the intervention), ongoing projects which may have impacted study effects and which could not be statistically controlled, and a sense that this project was not a priority or strongly supported by management. In particular, several projects initiated by hospital management were being implemented alongside our intervention and nurses and ward managers expressed confusion over which concurrent projects they were expected to prioritize given their high work demands. The occurrence of concurrent initiatives is common in the NHS and can lead to "project fatigue", and this may have been experienced by our participants. These demands also prevented them from attending Communities of Practice workshops, which they requested to be stopped. This suggests that a certain amount of resources are necessary from the outset for individuals to actively participate in organizational interventions, echoing previous work which argues that organizations need the necessary conditions, such as good job design and resources, to allow participants to successfully engage in interventions (Nielsen & Randall, 2012). Additionally, the hospital was placed under special measures during the intervention, which occurs when there are concerns surrounding the quality of care and which are designed to offer hospitals extra support to improve. This is likely to have negatively impacted staff morale and the hospital climate in general, decreasing staff motivation to participate.

Senior managers have an important role to play here. Nielsen, Randall, Holten, and González (2010) note the importance of participant readiness to change and senior manager support for the success of interventions. If senior managers were not able to emphasize the importance and benefits of our intervention, individuals may have chosen not to participate. Poor senior manager support was reported informally by intervention staff and may have therefore been at least partially responsible for the lack of intervention effects. In sum, it appears that the hospital climate did not facilitate intervention success and that participants did not have adequate initial resources to engage with it. In accordance with other researchers, we strongly advise future researchers to conduct process evaluations of intervention studies as a matter of course in order to explore in more detail the reasons why and how interventions work (e.g., Carroll et al., 2007; Nielsen et al., 2010, 2010).

The second aim of this study was to explore the psychological mechanisms underlying the intervention, specifically, whether work-related needs mediated between intervention participation, job resources, and work engagement. This was partially tested by removing intervention participation as a predictor and using the larger, unmatched sample. Results revealed that all three work-related needs significantly mediated between colleague support and work engagement and influence in decision-making and work engagement. This partially supports Hypothesis 2a–f and fully supports the relationships observed in Van den Broeck and colleagues' (2016)

meta-analysis. The strongest absolute indirect effect size, and the second largest relative effect size, was observed between influence in decision-making and work engagement mediated by autonomy. This suggests that perceiving an ability to impact on the work environment is particularly important for employees' wider sense of freedom over their work and their ability to carry out their jobs in the way they see fit. Although this relationship is theoretically supported in the literature (e.g., Bakker & Demerouti, 2007), it has not knowingly previously been tested; therefore, this is an important finding with implications for the design of work. If managers promote work environments with the opportunity for employees to collaborate, share ideas, and participate in organizational decisions, individuals' sense of autonomy and work engagement is likely to increase.

Autonomy also significantly, negatively, mediated the relationship between job demands and work engagement; however, competence did not. This supports Hypothesis 2g but not 2h and supports Van den Broeck and colleagues' (2016) findings in which a negative relationship was observed between autonomy and the specific job demand, workload. JD-R theory proposes that job demands will have a negative relationship with positive outcomes (Bakker & Demerouti, 2007, 2008), and this was observed for the relationship between demands, autonomy, and engagement. Further, the strongest relative effect size was observed for the negative relationship between job demands and work engagement, mediated by autonomy. In accordance with JD-R theory (Bakker & Demerouti, 2007, 2008), this suggests that the presence of factors which are detrimental to the achievement of work goals, such as a high workload or insufficient staff or time, negatively affects individuals' sense of freedom to carry out their jobs in the way they feel best and their subsequent work engagement. For example, if there are insufficient staff to allow staff to take adequate breaks, individuals may become fatigued and liable to make errors regarding care decisions. Designing work environments with autonomy in mind, perhaps by increasing opportunities for participating in decision-making, may be one way of counteracting this negative effect.

The absence of mediation through competence suggests that whether individuals feel a sense of ability to achieve work goals and a sense of belonging with their colleagues does not depend on their perception of job demands. Thus, employees may still feel in possession of the knowledge, skills, and ability to carry out their work as effectively as possible and still perceive that they belong on their ward and are part of a team, despite the presence of job demands. This could be explained by a buffering effect of resources, whereby sufficient resources protect against the negative effects of high demands, as proposed by the JD-R model (Bakker & Demerouti, 2007, 2008).

The presence of both significant indirect and direct effects indicates partial mediation and, in fact, one of the limitations of the relative indirect effect is that it could be inflated owing to other mediators being correlated with one of the mediators under study (Preacher & Kelley, 2011). It is therefore possible that other mediation pathways may lead to work engagement, besides through the satisfaction of needs. For example, in the relationship between participation in decision-making and work engagement mediated by competence, it is plausible that the personal resource, self-esteem, might act as another mediator correlated with competence. Conservation of resources theory (Hobfoll, 2002) suggests that in environments rich in resources, individuals tend to accumulate resources. Thus, the opportunity to regularly participate in decision-making could increase self-esteem and correlate with competence due to an increased belief in the ability to carry out one's job efficiently and effectively and impact on the work environment.

Strengths and limitations

This paper is the first study to assess the effect of team-based participatory techniques for increasing work engagement in healthcare staff, offering a novel means of taking work engagement intervention research forward. It is also the first to attempt to investigate the mediation relationships between intervention participation, resources, work-related needs, and work engagement espoused by JD-R theory. Mediation was observed between resources and demands, needs, and engagement, providing support for the theoretical underpinnings of JD-R theory. Specifically, our study empirically advances existing knowledge by assessing the mediation relationship between the job resource, influence in decision-making, needs, and work engagement, which has not before been tested. Influence in decision-making is an important job resource within the work environment given the positive benefits individuals gain from perceiving an ability to make an impact and have some control over the course of those changes.

Despite these strengths, there were three key limitations of this study: (1) difficulties implementing the intervention successfully, (2) a low-matched sample size, and (3) the cross-sectional nature of the sample used for the mediation analyses. In terms of the first limitation, an environment impoverished in resources affected the ability to implement the intervention as planned and highlights the need for adequate pre-intervention levels of resources. In addition, it was not possible to conduct interviews or a full process evaluation in order to explore how and why the intervention did not produce the expected effects due to limited resources. In terms of the second limitation, the low sample size of the matched sample may have reduced the statistical power of the repeated measures ANOVAs conducted to evaluate the intervention, resulting in type I or II errors (Tabachnik & Fidell, 2007). The low sample size may have also reduced the representativeness of the matched sample, generating bias and the unexpected results obtained. Furthermore, regression to the mean may have occurred, where scores on a variable are not similar to the population mean on the first measurement and move towards the population mean on the second measurement (Bland & Altman, 1994). Multilevel modelling in which relationships at a ward level are investigated was also not possible due to the small number of participating wards, which again would have severely compromised the robustness of the results. The low-matched sample size also precluded us from fully testing the psychological mechanisms

underlying the intervention, although we were able to partially test them.

In terms of the third limitation, the cross-sectional nature of the larger, unmatched sample which was used for the mediation analyses precluded inferences regarding causality. The heterogeneity of this sample may have also caused bias, with a small minority of Time 2 respondents having been exposed to the intervention. However, a similar set of results was observed when intervention participation was included as a control, suggesting robustness, although caution should still be applied when interpreting these results. In terms of the analysis of intervention effectiveness, the cross-sectional nature of the unmatched sample was overcome by performing multilevel analyses on the complete sample, which included all those who had responded at a single time point only, as well as all those who had responded at both time points. To confirm these results, future research needs to employ longitudinal designs with several waves.

Implications for future research and practice

Whilst the PAR intervention showed potential, this intervention was not successful. Implementation was difficult which may explain the lack of effects observed. In order to move beyond speculation over the causes of unsuccessful interventions, we need more well-designed studies which incorporate full-process evaluations. Exploring whether factors affecting implementation or the intervention itself can be attributed to unsuccessful interventions is key to determining how and why interventions work. This echoes a growing body of research which calls for the thorough evaluation of factors which may have affected intervention implementation as an essential part of evaluating intervention effectiveness alongside a traditional statistical analysis of intervention effects (see Nielsen et al., 2007, 2010). In addition, researchers and practitioners should assess participant and organization readiness for change prior to implementing interventions. If the organizational climate is not conducive to change, and employees do not maintain the motivation to change throughout the intervention, change is unlikely to happen (Nielsen et al., 2010). Support is necessary from the top down, with top-level managers conveying their belief in the value of the intervention to senior, middle, and all remaining managerial levels. Without this, employees are unlikely to feel supported to attend interventions and actively engage and may not understand why doing so is important. Ironically, it is those staff who are low in engagement and most likely to benefit from an intervention who may be least likely to fully participate in the intervention. Carroll et al. (2007) note that participants who view interventions as irrelevant to them are less likely to partake in them. We need strategies for effective implementation in environments characterized by high job demands and relatively impoverished in resources such as time and senior manager support.

Alongside the above, we have indicated how the NHS is known for its "culture of improvement", with several initiatives often ongoing concurrently. This can be overwhelming for staff, dilute the impact of individual projects, and create confusion over which projects to focus on. This creates an enormous barrier for researchers, as few resources are likely to remain on which researchers can capitalize. A participatory intervention in particular is a serious endeavour requiring large amounts of time and resources. This is accentuated in the case of macro-interventions which may occur across entire organizations. We urge organizations to consider their resource limitations when deciding on which projects to initiate, and when. The aims of an intervention may supplant the necessity to carry out other projects, increasing efficiency alongside reducing the demands on staff from other projects. Alternatively, an intervention could be timed appropriately so that it occurs after other projects are due to end. We acknowledge that this is likely to be difficult to negotiate, but a worthwhile endeavour which may result in a compromise, whereby some extra demands and projects are reduced or stopped during the intervention's duration.

This study also highlights the need for multi-wave, longitudinal intervention designs, with their superior ability to assess the causal relationships between variables, explore the psychological mechanisms underlying an intervention, and test theory (Nielsen & Miraglia, 2017). Such studies are imperative for mediation analyses, with cross-lagged and daily diary studies offering some ways that future studies could assess longitudinal relationships. In particular, Van den Broeck and colleagues (2016) found that most studies investigating the relationships between resources, work-related needs, and outcomes were cross-sectional and used self-report measures only, increasing their susceptibility to common method variance, in which effects observed are exacerbated (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The absence of a sufficiently large, matched sample in this study prevented a longitudinal mediation analysis and highlights the difficulty in carrying out this type of organizational research in practice.

Besides longitudinal designs, future work engagement intervention research could endeavour to include objective measures, such as others' ratings of the work engagement of an employee. Biological markers to indicate high levels of work engagement could be explored, with increased work engagement and well-being potentially being associated with decreased levels of stress hormones, blood pressure and cholesterol, and increased sleep quality. This approach is more commonly applied within stress management research (for a good review, see Ganster & Rosen, 2013) but is plausible here, given the associated increase in well-being and decrease in negative outcomes such as stress and burnout predicted by the JD-R model and observed empirically (e.g., Bakker & Demerouti, 2007, 2008, 2004; Hakanan, Schaufeli & Taris, 2008).

Furthermore, practitioners, managers, and organizations should consider need satisfaction in the design of jobs in order to promote work engagement. Managers could achieve this by conducting regular appraisals and informal, one-to-one meetings with employees, in which they discuss employees' needs and goals and provide constructive, positive feedback. Working towards goals and challenges is likely to develop individuals' sense of mastery over tasks and their environment, satisfying their need for competence, whilst having the freedom to do so in the manner which they perceive best is likely to satisfy their need for autonomy (Van den Broeck et al.,

2016). Building close relationships with their supervisors, in which individuals feel valued and cared for, could also encourage a sense of relatedness (Van den Broeck et al., 2016). Some interventions involving goal setting, problem solving, and/or action planning components have demonstrated significant or borderline significant positive effects on work engagement suggesting the utility of this method (e.g., Biggs, Brough, & Barbour, 2014; Ouweneel et al., 2013; Rigotti et al., 2014).

Conclusion

This study offers a novel insight into the first participatory action team intervention to our knowledge to be conducted in the healthcare sector to increase work engagement. It also highlights the difficulties with carrying out intervention research in organizations. Hospital-wide change initiatives, the general climate of the hospital, and media interest in standards of care all served to accentuate the challenges involved. Alongside a stream of other research, we advocate the use of flexible designs, process evaluations, and gaining the buy-in of senior managers and employees to counteract some of these difficulties and further knowledge around how and why interventions work. Our results have important practical significance for work engagement intervention research as they suggest that interventions which serve to satisfy individuals' needs for autonomy, competence, and relatedness by increasing job resources are most likely to be effective and should be considered in the design of future interventions. In sum, it is hoped that these findings stimulate further dialogue regarding the mechanisms underlying work engagement interventions and pave the way for future researchers and practitioners to effectively and efficiently progress the field.

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